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ABSTRACT

The emergence of a new theoretical framework for research in human development is discussed. The theoretical perspective is contrasted with the classical laboratory experiment, which produces ecologically invalid research because of the restrictions of the artificial laboratory environment. The emerging framework enhances ecological validity by incorporating four sets of properties: (1) reciprocality, which refers to the two-way nature of the model, so that the child is viewed as a stimulus and a socializing agent as well as a reactive being; (2) role specification, characterized by role delineation for each participant in the research and the systematic examination of these roles as independent variables; (3) N-person versus two-person systems, which refers to the extension of the number of participants studied (study of mother-child, father-child, mother-father interactions as opposed to mother-child interaction only); and (4) second-order effects, the study of the effects of a third person or external agents (e.g., equipment designed for infant stimulation or, at an older age level, television) on human interaction. It is argued that most environmental variance on human behavior derives from second-order impact of societal institutions, and therefore an examination of secondary effects is valuable for scientific analysis and the enhancement of human development. [Not available in hard copy due to marginal legibility of original document.] (DP)

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An Emerging Theoretical Perspective for Research in Human Development

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A new theoretical perspective is emerging in research in human development. The full conceptual model is not to be found in any single investigation. Rather, various elements, or combinations of them, appear in different areas of research, scattered over time and topic in the published literature of the past few years. It is the purpose of this paper to identify these elements, consolidate them, and to consider the implications of the emerging framework for the direction and design of future research in human development.

One way of describing the basic features of the emerging theoretical perspective is to examine how it differs from the most firmly established, widespread, and prestigeful research model employed in this as in all areas of scientific psychology -- the classical laboratory experiment. As typically carried out, that model exhibits certain properties which impose important and sometimes still unrecognized theoretical constraints.

First, it is ordinarily limited to a two-person system involving, or at least confining attention to one experimenter and one child -- the latter typically -- and significantly -- referred to as a "subject."

The term "subject" reflects the second major restriction. The process taking place between experimenter and child is ordinarily conceived of as unidirectional; that is, one is concerned with the effect of the experimenter's behavior on the child, and not the reverse.

[1] The author expresses appreciation to his students, who have contributed significantly to the development of the ideas here presented. In addition, he is indebted to a number of colleagues for incisive and constructive criticism, especially Alfred L. Baldwin, John C. Condry, and Melvin L. Kohn.

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Third, this second participant in the system, the experimenter, is usually a stranger, nine times out of ten a graduate student, whose prior relationship to the child is non-existent, or if existent, trivial in character.

Fourth, and most important of all, the two-person system exists, or is treated as if it existed, in isolation from any other social context that could impinge on or encompass it.

These four features so common in our experiments are hardly characteristic of the situations in which children actually develop. Thus in the family, the day care center, preschool, play group, school classroom, or neighborhood:

1. There are usually more than two people.
2. The child invariably influences those who influence him.
3. The other participants are not strangers but persons who have enduring roles and relationships vis-a-vis the child.
4. Finally, the behavior of all these persons is profoundly affected by other social systems in which these same persons participate in significant roles and relationships, both toward the child and each other.

The contrast between the conditions that have traditionally prevailed in our laboratory experiments and those that exist in the child's everyday life situation points up the fact that much of our research has been ecologically invalid. By removing the child from the environment in which he ordinarily finds himself and placing him in another setting which is typically unfamiliar, short-lived, and devoid of the persons, objects, and experiences that have been central in his life, we may be getting an incomplete and impoverished picture both of the child and his environment. The potentialities of each to influence the other may be substantially greater than we have thus far seen.

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It is precisely in this sphere of enhancing ecological validity that new research developments are taking place. Viewed from a theoretical perspective, these developments point to four sets of defining properties for an emerging conceptual model. We turn to an examination of these four specifications and the kinds of research which they generate.

1. Reciprocality. First and foremost, the emerging model is conceived as a two-way system, in which the behavior of each participant both affects and is affected by the behavior of the others. Thus, in a laboratory experiment, one would have to be concerned not only with changes in the child's response as a function of the behavior of an experimenter but also with the reverse; that is, the effects on the experimenter of the behavior of the child. The same consideration would apply to studies of other socialization systems such as parent and child, teacher and child, the child in the group, etc.

The importance of reciprocality as a defining property of any adequate model for the socialization process has been recognized in theoretical discussions (e.g., Bronfenbrenner, 1968; Gewirtz, 1969a, 1969b; Rheingold, 1969a), but in research practice the principle has been more honored in the breech than in the observance. For example, only a very few studies have analyzed mother-infant interaction as a reciprocal system (e.g., S.M. Bell, 1971; Gewirtz and Gewirtz, 1965; Moss, 1967), and none, to this writer's knowledge has examined interaction between infant and experimenter as a two-way process.

The property of reciprocality implies two important corollary principles which have received some attention in empirical work.

a. The child as stimulus. The child is to be viewed not merely as a reactive agent but as an instigator of behavior in others. To use the language of Kurt Lewin (1936), the child has "demand characteristics" which tend to evoke certain

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patterns of response in others. Thus a young baby's "cuteness," and even more clearly its cry, invite, indeed almost compel a reaction from persons in its immediate environment. An adequate research model must take into account the almost inevitable impact of such demand characteristics on others, including the experimenter.

The role of the child as a stimulus and instigator of response has been stressed by a number of developmental psychologists, especially R.Q. Bell (1968, 1971). There are also a few direct studies of the phenomenon as manifested in the relation between mother and infant (S.M. Bell, 1971; Gewirtz and Gewirtz, 1969; Moss, 1967; Moss and Robson, 1968), but only the last is based on systematic analysis of the actual sequence of mother-infant interaction in a substantial sample (54 pairs). Nevertheless, all four studies show striking evidence for the predominance of infant-initiated over mother-initiated behavior in the first year of life. This writer has not been able to find any studies of this phenomenon for later ages.

As illustrated by Moss's research (1967), focusing attention on the child as a stimulus also brings to light the role of genetic and constitutional factors in giving both impetus and direction to the socialization process. Thus Moss argues persuasively from his data that the greater "soothability" of female versus male infants in the first weeks of life sets in motion a more rapidly converging pattern of mutual reinforcement and attachment which contributes to the emergence of sex differences in early language development and social relationships.

b. The child as socializing agent. The potency of the child as a stimulus takes on added significance in any situation involving protracted interaction between the child and another person. For, over a period of time, not only does

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the adult produce lasting changes in the behavior of the child, but vice versa. In other words, not only does the mother, or other consistent caregiver, train the child, but the child also trains the mother, a phenomenon of considerable importance for human development not only in terms of science but also of social policy on day care, children's institutions, etc.

The role of the child as a socializing agent has been emphasized by a number of writers (R.Q. Bell, 1968, 1971; Rheingold, 1969a), and Richard Bell (1968) has reinterpreted the findings of a large number of researches on socialization as possibly reflecting the influence of the child on the adult. But a search for direct studies of the phenomenon has proved unsuccessful. Despite considerable emphasis on the theoretical importance of this effect and some inferential evidence in support of its existence, as yet there appears to be no systematic investigation specifically focusing on and documenting the way in which a child, through such processes as reinforcement and modeling, produces enduring changes in the behavior of an adult, such as a parent, teacher, or -- wonder of wonders -- an experimenter.

In the absence of studies of this kind, it appears desirable to suggest some research designs which would make possible the analysis of socialization as a reciprocal process. Here are two examples of research currently under way.

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(1) The effects of actual and attributed sex on adult-infant interaction. James Garbarino[2] has proposed an experiment for testing directly some of the hypotheses on the genesis of sex differences in child rearing derived by Moss from his observational study (1967). The experiment employs the technique of cross-labeling developed by Condry, in which infants of each sex are identified by false names, with half of the girls being given boy's names and vice versa. Using a group of volunteer student caretakers, Garbarino proposes to examine the

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development of sex differences in the treatment of children as a joint function of actual and attributed sex. He hypothesizes that, even when the infants are cross-labeled, patterns of behavior associated with their actual sex will evoke differential response from the caretaker in terms of such variables as response to crying, talking to the infant, and, in particular, the frequency of responses contingent upon the infant's behavior.

(2) The impact of the child's initiative on mother-child interaction. Bonny Park[3] has designed an experiment to gauge the effect on the child's initiative in shaping the course of mother-child interaction. Working with a sample of preschool children she asks the mother to present the child with a story picture-book under two different sets of instructions. In one, the mother is asked to look at the story with the child "the way you usually do." In the other, the mother is told that the primary interest is in what about the book attracts the interest of the child; therefore the mother is to let the child take the initiative. The dependent variables relate differences in pattern of mother-child interaction instigated by the two sets of instructions, with particular reference to the relative frequency of reciprocal reinforcement, imitation, and alternation from one participant to the other.

Both of these examples illustrate an important feature that distinguishes the present research designs from those traditionally employed in socialization studies. In the latter, the independent variable is typically the behavior of an adult and the dependent variable the behavior of the child. In the present examples, both adult and child behaviors are analyzed as dependent variables. The independent variable in each case is some systematic variation in the ecological situation -- in the first example, actual vs. attributed sex of the

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child; in the second, an instruction influencing the extent to which the child is permitted some initiative in the interactive process.

A second distinctive feature of the reciprocal model is that the dependent variables cannot be confined to the behaviors of the adult and child as separate individuals, but must describe properties of their interaction in a two-person system. Thus it would not be sufficient to compute measures based on the frequency with which the mother engages in an action vis-a-vis the child or vice versa. One needs in addition indices which reflect the interdependency between behaviors of the two participants; for example, the probability that an act of A is directly followed by an act of B, and vice versa, or the number of alternations in action between A and B per unit of time. In computing such measures it would be important to take special note of reciprocations in kind (e.g., smile followed by smile) or within the same modality (e.g., vocalization followed by vocalization) as distinguished from non-imitative sequences (e.g., vocalization followed by eye contact). Finally, and most importantly, attention must be given to convergence phenomena, such as increased rates of alternation or homologous response over time, which would reflect the development and strengthening of a reciprocal system.

2. Role Specification. A second requirement of an ecologically valid model is that the roles of other participants besides the child be specified and systematically examined as independent variables. Two types of roles are usefully distinguished. First, there are the persons who play specific and enduring roles in the child's life, such as mother, father, older brother, teacher, friend, etc. G. H. Mead (1934) coined the term "significant other" to designate this special kind of special relationship, and we shall follow his usage. A second type, presumably derived from the first, involves more generalized roles, such as male adult, female adult, older child, younger child, etc.

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Significant others. It is a sobering fact that in terms of direct observation and experiment, we know more about the impact on the child of an unidentified stranger, who happens to serve as an experimenter, than of the child's own parents, family members, and other close associates. Although direct observational and experimental studies of mother-infant interaction during the first two years of life have shown a gratifying increase over the past decade (e.g., Ross, 1961, 1963, 1965, 1969; Kagan, 1971; Lewis, 1969), analagous investigations for children three years of age and older are still comparatively rare. There are a few observations of mother-child interaction in preschoolers (Baldwin, 1947; Caldwell et al., 1970; Hilton, 1967; Lasko, 1954, Mussen and Parker, 1965; Rothbart, 1971; Schoggen and Schoggen, 1969, 1971). But beginning with the school age child, virtually all the research on mother-child relationships still relies on far from adequate verbal reports.[4]

As for father-child interaction, direct observational or experimental investigations are extremely rare.(Bann and Lewis, 1971; Rebelsky and Hanks, 1971). The findings indicate that, although American fathers spend only 10 to 20 minutes a day attending to a child under one year of age, they nevertheless have an impact on the infant's response, particularly with respect to more distal interactions such as eye contact and vocalization. With the exception of these two researches, this writer has been unable to find any direct studies of father-child interaction until adolescence (Strodtbeck, 1958; Rosen and D'Andrade, 1959), and both of these investigations are limited to boys.

Even more conspicuous than the absence of the father in research on the child rearing is the absence of any other representative from the child's world besides his parents. For example, the effect on the child of interaction with

4 A notable exception is Rosen and D'Andrade's (1959) ingenious experimental study.

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his siblings, both older and younger, is virtually unexamined except in occasional clinical case studies. Even more striking is the almost complete exclusion of adult relatives. A search of the literature yielded very few studies (Kahana and Kahana 19) of the role of such figures as grandmothers, grandfathers, uncles, or aunts, at least in Western countries. Perhaps investigators are prepared to assume that, in our modern mobile society with its shrunken nuclear family, such persons can no longer play a meaningful role in the lives of children. If so, then at least we should expect some attention to the principal agent who has taken their place as parent substitute -- the ubiquitous member of every American family containing young children -- the babysitter. But again the research annals are silent on the subject. To be sure, there is a growing literature on the reaction of the young child to a stranger (e.g., Morgan and Ricciuti, 1969; Rheingold, 1969b; Schaffer, 1966; Wahler, 1967) but, to date, attention has been limited to the immobilizing, anxiety producing impact of the initial encounter with no follow-up on the subsequent course of interaction of repeated contact over longer periods of time.

In summary, if we are to judge by the research literature, only if and when the child enters nursery, preschool, or school can other people besides parents significantly influence his life, and even these persons are limited to teachers and peers operating within an educational setting. The extended family, the informal peer group, older and younger children, other adults, the street, the neighborhood -- all of these have remained outside the pale of direct investigation as agents affecting or affected by the developing child.

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Generalized roles. The possibility that the young child may be differentially and significantly responsive to persons not only as particular individuals but as possessors of more generalized characteristics such as sex, age, or social background has also been largely overlooked. Part of the reason derives from a scientific tradition which defines the experimenter as a neutral nonentity excluded from substantive consideration in the experimental design. Significantly referred to only as E, bereft of age, sex, or social identity, he is treated as if he were an interchangeable part of the research apparatus, like a light bulb. In point of fact, the experimenter is not just anybody, but always someone of a particular age, sex, and social background. And in the few studies that have taken such factors into account, the evidence indicates that they can be of considerable importance. For example, differences in child's response associated with the sex of the stimulus person have been reported in the first year of life (Kagan and Lewis, 1965) and, in Soviet research, even within the first three months (Codovika, 1969). Differences in test performance as a function of race of examiner have been documented for both Negro and White children from the first grade onward (Abramson, 1969; Katz, Henchy, and Allen, 1968; Kennedy and Vega, 1965; Sattler, 1966; Turner, 1971). It appears likely that similar differences would be found in responsiveness to reinforcement, modeling, and other social influence techniques not only in terms of the race of the experimenter but also his ethnic and social class background as reflected in speech pattern, gestures, attire, etc. The further demonstration of such experimenter effects would have obvious and important implications for the interpretation of the ethnic and social class differences in performance so commonly found in the research literature.

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Several studies report complex and varied interactions between the sex of the experimenter and the sex of the child (Bandura et al., 1963; Cicutat, 1965; Freyrear and Thelen, 1969; Gewirtz, 1954, Gewirtz and Baer, 1958; May, 1966, Stevenson, 1961; Stevenson and Allen, 1964; Stevenson and Knights, 1964), but such results are uninterpretable without reference to the roles which persons of different sexes play in the contexts in which the child sees them. Such research has yet to be carried out.

3. Two-Person vs. N-Person Systems. Expanding the socialization system to include more than two people increases opportunity for both role differentiation and reciprocal response. To take the classical example of a three-person system -- the nuclear family, we have within it the possibility of differential allocation of parental roles between father and mother, and, now, instead of only one dyadic relationship, a total of three -- mother with child, father with child, and mother and father. In each of these, patterns of reciprocal socialization take place which may duplicate, complement, or even contradict each other, with profound consequences not only for the behavior and development of the child but also of the two adults in their roles as parents, and of the nuclear family as a total system.

The special structural and functional characteristics of the nuclear family as an interactive system have been discussed from a broad theoretical perspective (Parsons and Bales, 1955) but empirical work has been largely confined to examining the role of such factors in the genesis of psychiatric disorders (Ackerman and Behrens, 1956; Alkire, 1969; Farber and Jenné, 1963; Goldstein et al., 1968; Henry, 1956; Kohn and Clausen, 1956; Lidz et al., 1958). Except for indirect evidence from the now extensive research of the effects of father absence (summarized in Biller, 1970, and Herzog and Sudia, 1970), there appears

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to be only one study focusing explicitly on the effects of varying patterns of parental role differentiation on development in normal children (Bronfenbrenner, 1961a, 1961b, 1961c). The results indicated that adolescents showing the highest degree of leadership and dependability tended to come from families in which parental roles were differentiated, with some division between father and mother in the spheres of discipline and affection. Since the results of this investigation were based on correlations between questionnaire responses and sociometric data, the findings are yet to be confirmed by an observational study. They receive some indirect support, however, from the interpretation of their experimental results offered by Rosen and D'Andrade (1959).

The father-mother-child triad is clearly not the only ecologically important example of a three-person socialization system. Another is provided by the mother in simultaneous interaction with a first and second child. Unfortunately, none of the existing studies of differences in socialization of first vs. later borns (Baldwin, 1947; Lasko, 1954; Hilton, 1967; Rothbart, 1971) has actually employed a three-person model. The observations focus on the behaviors of mother with each child separately, so that the interplay among all three parties, especially between the two children, is overlooked. Also, these investigations have concerned themselves with only one parent — the mother. Inclusion of the father of course produces a four-person system, with a geometric increase in the number of possible reciprocal relationships. Nor, from an ecological point of view, are the important participants limited to parents and children. Conceivably they might also include a grandparent, babysitter, teacher, etc. In terms of research strategy, however, it would probably be wise to assess the role of such ancillary participants first in triadic situations involving parent, child, and third party.

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It should be recognized that the three-or more-person system provides opportunity not only for role differentiation but other configurational features that are foreclosed in only a two-person interaction. For example, with a third person present, there is the possibility of vicarious reinforcement or imitation in which the child, or adult, does not himself participate but is susceptible to what Bandura (1962, 1965, 1969) has called observational learning. Finally, a three- or n-person model permits the occurrence and analysis of a phenomenon of the greatest importance for socialization processes that has thus far received little systematic study: the influence of a third party on the pattern of reciprocal interaction between the other two.

4. Second-Order Effects. Ordinarily, research on socialization is confined to what might be called first-order effects -- the direct impact of one person on the behavior of another. But the pattern of interaction between two people, such as mother and child, can also be profoundly affected by third parties. Thus both mother and child may act differently toward each other in the presence of the father, younger child, or stranger. This is what is meant by a second-order effect.

The author has been able to find only one example of the systematic study of such second-order effects in the research literature. Though the content is a rather specialized one, the results are dramatic. I refer to the ingenious series of experiments by Rheingold (1969b) documenting the effect of the mother's presence on the young child's reaction to a stranger. Although when left alone with an unfamiliar person, ten-month-old infants exhibited considerable emotional distress, the appearance of the mother not only appeared to allay the fear of the stranger but instigated vocalization and exploratory behavior. It is as if the presence of the mother served as a catalyst enabling other kinds of interaction to occur.

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Within the family system itself, the potency and magnitude of second-order effects are reflected in the now voluminous literature on the impact of father absence (see above) and birth order differences (summarized in Clausen, 1966), but direct evidence for the phenomenon is almost completely lacking. What is needed are observational and experimental studies of the changes that occur in patterns of interaction as a function of the presence or participation of the third party. Such a formulation points to the need, for example, of studying the effects of father absence not solely in broken families, but, more importantly, in families that are intact, and in terms of the father's influence not only on the child but on the mother and the mother-child dyad. Conversely, we can now envision a new aspect to the study of maternal behavior: the impact of the mother on the father-child relationship. For example, are there any consistent differences in the behavior of father with child as a function of the presence or absence of the mother? Or, to consider a less obvious second-order effect, does consistent reliance on a babysitter have any systematic influence on the mother-child relationship, or the capacity of the child to relate to other adults?

It is important to recognize that the source for a second-order effect is not limited to another human being. For example, the recent research and discussion on the role of early stimulation in infancy has led to the development of new types of baby equipment. Thus a brochure recently received in the mail describes a "cognition crib" equipped with a tape recorder that can be activated by the sound of the infant's voice. In addition, frames built into the sides of the crib permit insertion of "programmed play modules for sensory and physical practice." The modules come in sets of six, which the parent is "encouraged to change" every three months so as to keep pace with the child's

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development. Since "faces are what an infant sees first, six soft plastic faces...adhere to the window," including a distorted face of the type so often included in recent studies of perceptual development in infants. Other modules include mobiles (among them a "changing faces mobile"), a crib aquarium, and "ego building mirrors." Quite apart from the effectiveness of such devices for accelerating the infant's cognitive development, one may ask what influence they have on adult-infant interaction. Are they likely to increase the frequency, say, of picking up the infant, reciprocal eye contact, vocalization, or lead to its reduction?

At an older age level, an analogous issue of second-order effects arises with respect to television. Much of recent research and public concern about television in the lives of children focuses on the influence of TV violence. But perhaps an even more important phenomenon, both scientifically and socially, is the effect of television in reducing social interaction. As the author has written elsewhere (Report of Forum 15, 1970): "The primary danger of television lies not so much in the behavior it produces as the behavior it prevents -- the talks, the games, the family festivities and arguments through which much of the child's learning takes place and his character is formed." It is this impact of television on the socialization processes within the family that needs to be investigated.

The role of television in changing patterns of interaction within the family points to the most potent form of second-order effect, one in which the external agent is not a single individual, but another ecological system that impinges on or encompasses the system in which the direct socialization is taking place.

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5. Experimental Human Ecology. Perhaps the best documented example of a second-order effect at the level of ecological settings rather than individuals is the influence of social class on socialization practices and outcomes (for a recent summary see Hess, 1970). Subsequently, Tulkin, Kagan, and others (Kagan, 1970; Lewis and Wilson, in press; Tulkin, 1970; Tulkin and Kagan, 1970) have identified reliable class differences in mother-infant interaction within the first year of life. Ecological differences of even larger order are of course found in cross-cultural studies (for a recent summary see Levine, 1970). But the difficulty with most investigations of this kind is that they shed little light on the processes through which cultural or class values come to affect child rearing practices, or vice versa. Clearly the connection is mediated through particular social structures and institutions in the society, such as schools, neighborhoods, places of work, and the like. An instructive example is provided by a recent observational study of mother-child interaction in Japan (Caudill and Weinstein, 1969). Utilizing Miller & Swanson's (1958) distinction between entrepreneurial and bureaucratic job settings, Caudill and Weinstein found that wives of independent businessmen were more likely to talk to, rock, and stimulate their babies than wives of a matched group of salaried personnel. The latter mothers were content to look and remain passive.

Second-order effects at an older age level are demonstrated in Bronfenbrenner's study (1970b) of matched groups of Soviet children attending day schools and boarding schools. Consistent with the hypothesis of the study, children reared primarily in a single socialization setting (the peer collective in the boarding school) differed from those exposed to two somewhat divergent contexts (peer collective at school, family at home). Children brought up in boarding schools subscribed more strongly to culturally approved values and showed greater conformity to social pressures in their immediate environment.

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In the foregoing examples, variation in ecological settings is observed as it occurs in society. But the full impact of ecological systems for the development of both science and social policy is to be sought not in experiments of nature but in experiments of man -- that is, through the deliberate design, systematic manipulation and scientific analysis of new ecological settings that can affect primary socialization processes. We refer to this approach as experimental human ecology.

There are few examples of this kind of experimentation in the research literature, but the few that do exist testify to its power and its promise. The most familiar is Skeels' (1966) remarkable follow-up study of two groups of mentally retarded, institutionalized children who constituted the experimental and control groups in an experiment he had initiated thirty years earlier (Skeels, Updegroff, Wellmann, and Williams, 1938; Skeels and Dye, 1939). When the children were three years of age, thirteen of them were placed in the care of female inmates of a state institution for the mentally retarded with each child being assigned to a different ward. The control group was allowed to remain in the original -- also institutional -- environment, a children's orphanage. During the formal experimental period, which averaged a year and a half, the experimental group showed a gain in IQ of 28 points, whereas the control group dropped 26 points. Upon completion of the experiment, it became possible to place the institutionally-mothered children in legal adoption. Thirty years later, all thirteen children in the experimental group were found to be self-supporting, all but two had completed high school, with four having one or more years of college. In the control group, all were either dead or still institutionalized. Skeels concludes his report with some dollar figures on the amount of taxpayers' money expended to sustain the institutionalized

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group, in contrast to the productive income brought in by those who had been raised initially by mentally deficient women in a state institution.

In seeking to explain the early gains showed by the children placed on the wards, Skeels calls attention to facts like the following. In each instance, one of the inmates in effect adopted the infant and became its mother; in addition, the entire ward was caught up in activities in behalf of "our baby." New clothes and playthings appeared, and the children were lavished with attention. Also, the several wards began to compete with each other in terms of whose baby was developing most rapidly.

All of these developments derive, however, from a deliberately-contrived ecological change — the restructuring of a social system in such a way as to maximize adult-child interaction.

A number of authorities have expressed serious skepticism about Skeels' dramatic results. Several of the crucial methodological issues raised by McNemar (1940) in his critique of Skeels' early work have in fact been refuted by the follow-up study and its clear demonstration that the early dramatic differences were not ephemeral either in their magnitude or durability. More recently, Jensen (1969) has called Skeels' work into question not on grounds of fact but of interpretation. Substantial gains in IQ, such as those reported by Skeels, he asserts, can be expected only in severely deprived children, whereas "typical culturally disadvantaged children are not reared in anything like the degree of sensory and motor deprivation that characterize, say, the children of the Skeels study."

In response to this criticism one need only point to a growing body of well-designed researches documenting significant and substantial gains in IQ and related measures for samples clearly representative of disadvantaged

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families (Gray and Klaus, 1970; Hodges et al., 1967; Karnes et al., 1970; Palmer, 1972; Schaefer, 1969a; Schaefer and Aaronson, 1972; Weikart, 1969). Of particular significance, in terms of second-order ecological effects, is the study by Karnes, which involved no work directly with the children themselves but only with their mothers. Fifteen mothers, all but one of them Negro, from economically depressed neighborhoods, attended weekly two-hour meetings over a 15-month period. The project provided transportation and costs of babysitters for the mothers' initially 12-24 month old infants. During the meetings,

> ...mothers in disadvantaged families were provided a sequential educational program to use at home in stimulating the cognitive and verbal development of their children and were instructed in principles of teaching which emphasized positive reinforcement. In addition to these child-centered activities, a portion of each meeting was devoted to mother-centered goals related to fostering a sense of dignity and worth as the mother demonstrated self-help capabilities within the family setting and the community at large. (P. 926)

Two types of control groups were employed -- one consisting of children of similar family background,[5] the other of siblings of the experimental children, who had been tested previously at similar ages prior to the mother's enrollment in the training program. At the end of the 15 month period, when the children averaged three years of age the experimental group showed a 16-point gain in IQ over their matched controls and a 28-point gain over their own siblings, cared for in the same home by the same mother prior to her exposure to the program.

The rather powerful implications of this experiment are well summarized by the authors.

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[5] The children were matched on family size, working status of mother, mother's birthplace, mother's education, presence of father or father surrogate, and welfare status.

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> The 16-point Binet IQ difference between the infants whose mothers worked with them at home and the control infants nearly equals the 17-point Binet IQ difference between the experimental and control subjects in the Schaefer study, where the educational intervention was carried out by college graduates who served as tutors, visiting the child at home for 1 hour a day, 5 days a week, over a 21-month period...Since at-home intervention by mothers can be budgeted at a fraction of the cost of tutorial intervention, the direction for further research in preventive programs of very early intervention seems clear. Further, programs which train the mother to serve as the agent for intervention hold potential for developing her self-help capabilities and sense of personal worth, pivotal factors in effecting broader changes within the disadvantaged family. Not only may the mother represent the ideal agent for fostering an improved school prognosis for the young disadvantaged child, but through group interaction she may extend this sense of responsibility for infant, self, and family to the wider community in which they live.[6](P. 934)

Results paralleling those of Karnes are reported in a recent study by Levenstein (1970). Working once a week with a group of mothers of 2-3 year-olds from low income families, Levenstein demonstrated the use of books and toys as a means to stimulating mother-child interaction. Over a seven-month period, the children showed a mean IQ gain of 17 points.

In the light of Karnes' and Levenstein's findings, it is noteworthy that of the more conventional intervention programs, in which the child is worked with directly, those showing lasting effects have involved a strong component of parent involvement (Gray and Klaus, 1970[7]; Weikart, 1969). Despite substantial gains at the end of the program, follow-up studies in other group intervention projects report gradual attenuation of differences between the experimental and control groups, with no significant effects after two or three years (Hodges et al., 1967; Palmer, 1972; Schaefer, personal communication). And even before the dramatic effects of his tutorial intervention program had "washed out" at the end of two years, Schaefer (1969b) had concluded from a review

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[6] The authors note in this connection that at a local meeting called to discuss the possibility of establishing a parent-child center in the community, twelve of the fifteen mothers attended "and were in fact the only persons indigenous in the neighborhood in attendance."

[7] Gray and Klaus also found positive changes in the younger siblings of the target child, additional evidence of the power of second-order effects.

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of the literature: "Evidence that mean IQ scores increase during intensive stimulation and decrease after such stimulation is terminated [is] cited as supporting family centered programs." Additional results consistent with this conclusion come from the growing body of research on the effects of parent participation on the child's capacity to profit from intervention programs (Gilmer, 1969; Grotberg, 1969; Hoffman, Jordan and McCormick, 1971; Strickland, 1967; Weikart and Lambie, 1968; Willmon, 1969).

Such findings provide post hoc support for a general principle that guided the design and development of the Head Start program. Early in its deliberations, the Planning Committee of Project Head Start, of which this writer was privileged to be a member, stressed in its statements and memoranda to Government officials that the immediate objective of the program should be to effect positive changes not in the child himself (e.g., gain in IQ) but in his enduring environment in home, neighborhood, and community. The former, we emphasized, were easily achieved, but likely to be short-lived; only the latter could give promise for continuing psychological development.

As the foregoing statements imply, ecological intervention as a strategy both for the scientific analysis and enhancement of human development can not be limited to the establishment of preschool or parent education programs. The principle applies to the full range of ecological systems that directly or indirectly impinge on the world of the child and those immediately concerned with his welfare. For example, this author has argued elsewhere (Bronfenbrenner, 1972) that the key to an understanding of socialization in contemporary American society, and the Western world generally, lies in the phenomenon of segregation by age, and the alienation which such segregation produces. This segregation, in turn, is the unintended consequence of developments in many different aspects of contemporary life. A host of factors conspire to isolate

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children from the rest of society. The fragmentation of the extended family, the separation of residential and business areas, the disappearance of neighborhoods, supermarkets, zoning ordinances, occupational mobility, commuting, child labor laws, the abolishment of the apprentice system, consolidated schools, television, the decay of public transportation, separate patterns of social life for different age groups, the working mother, the delegation of child care to specialists -- all these manifestations of progress operate to decrease opportunity and incentive for meaningful contact between children and persons older, or younger, than themselves.

Ecological changes are crucial not only for the solution of urgent social problems. They are also critical for the further development of adequate theory and research on the process of human development. It is the central thesis of this paper that most of the environmental variance in human capacities, motivations, and behavior derives not from first-order socialization effects within family, classroom, or peer group, but from the second-order impact of other institutions in the society, such as the world of work, public transportation, or the structure of neighborhoods. Moreover, instead of attempting to study these in the scientifically confounded and, nowadays, often socially disintegrated form in which nature, or -- more accurately -- society gives them to us, we should endeavor to create new ecological arrangements designed simultaneously both to solve pressing social problems and to test important theoretical propositions.

I close with a few examples of possible research designs for such an experimental human ecology.[8]

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[8] The practical, programmatic, and public policy aspects of these proposals are discussed in Bronfenbrenner (1972).

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1. A study currently under way is based on an adaptation of a Soviet pattern in which business organizations "adopt" groups of school children and establish relationships of mutual visiting, help, and interest in each others' work (Bronfenbrenner, 1970a). Such a program has been introduced in a New England community. The parents of the children are not directly involved, but changes are being assessed in the attitudes of parents toward their children and children toward their parents.

2. A related design involves giving older children some responsibility for the young in the primary grades. They are to escort the younger children to and from school, teach them games, help them with schoolwork, etc. Dependent variables include changes in the older children's school performance, career plans, reading interests, views on child rearing, and behavior at home.

3. An educational program is set up for couples expecting their first child. Both husband and wife must volunteer to be included but only one spouse is selected (on a random basis). After completion of the program and arrival of the child, observations are made of mother-infant interaction. Higher frequency of reciprocal response is predicted for mothers whose husbands attended the program than for the mothers who attended themselves.

4. A large business firm employing working mothers is persuaded to introduce, in selected departments, an option of part-time employment. Mothers volunteer for this option with the understanding that both the experimental and control group would be selected from among the volunteers. To compensate for the Hawthorne effect, the control group receives some other fringe benefit, such as longer vacation periods. The dependent variables in the study relate to changes in patterns of interaction within the family and their effects on child behavior and development.

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5. Two comparable low-cost housing projects are selected which differ in that one of them has shops and services within easy walking distance, the other involves a trip by car or bus. The dependent variable is the amount of time parents and other adults spend in interaction with school age children and the consequent effects on the children's behavior and performance both in and out of school.

Hopefully such investigations would have a beneficial effect simultaneously in two domains. They would contribute to making human beings more human -- both in research, and in reality.

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